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# OVARIAN TUMORS

BY


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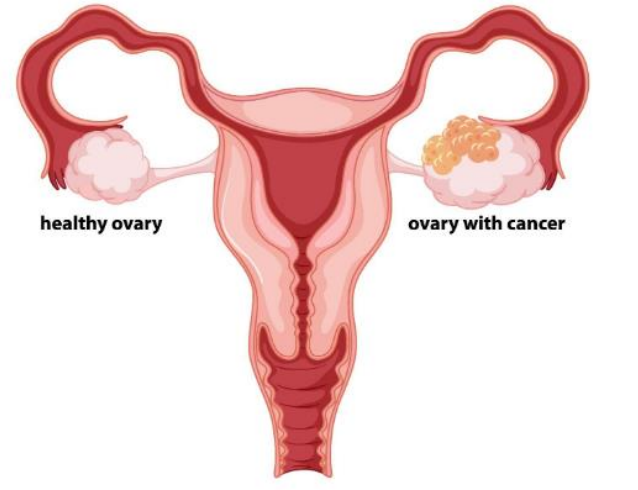

# Objectives

Learning Outcomes

- Identify the classification of ovarian tumors
- Identify the Pathological aspects of surface epithelial tumors
- Determine the Identify the Pathological aspects of germ cell tumors
- Identify the Pathological aspects of sex cord tumors
- Identify types of ovarian cysts

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# Classification of ovarian tumors

## 1- Surface epithelial tumors

- 70-80%
- Origin:
- from the surface epithelium of the ovary.

## 2- Germ cell tumors

- 15-20%
- Origin:
- Germ cells

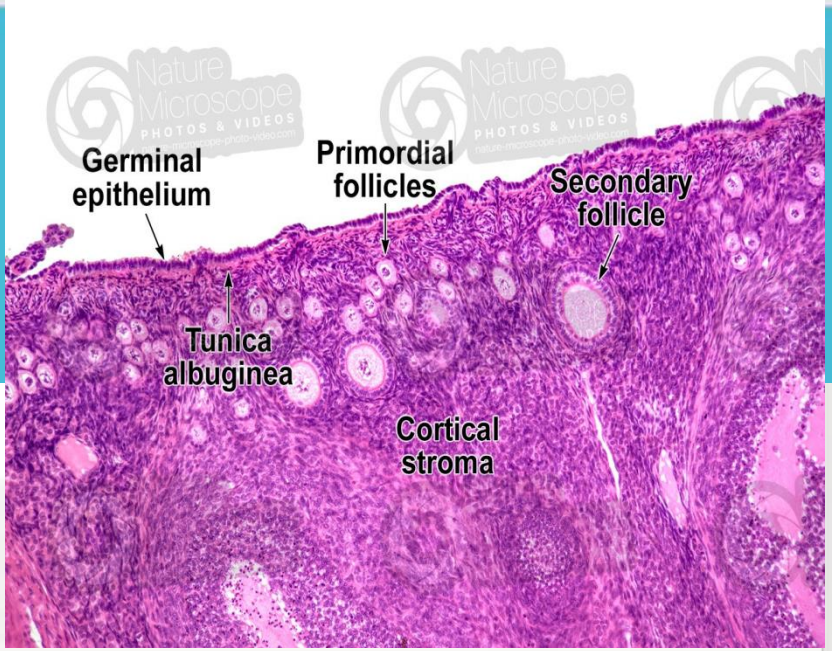
## 3- Sec cord stromal tumors

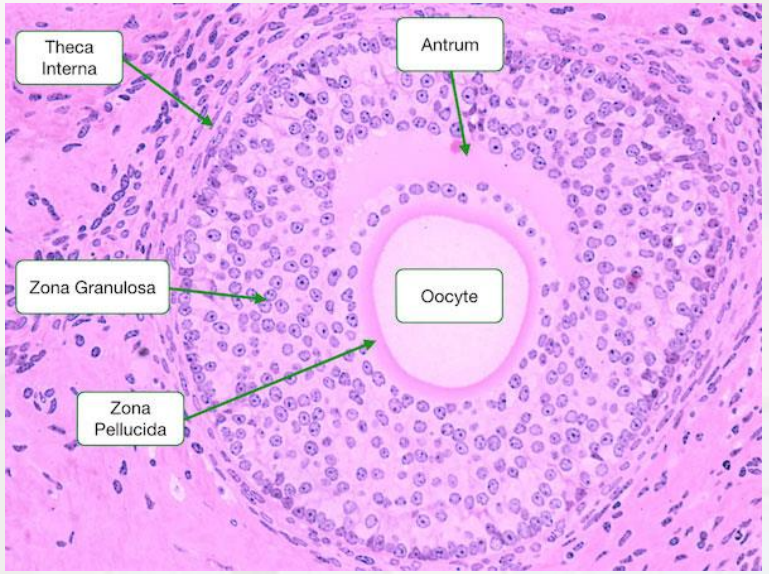
- 5-10%
- Origin:
- Stroma of the ovary

## 4- Metastatic tumor: 5%

# Histology of ovary

- **Main point**
- **Germinal Epithelium:**
- **Cortex: The outer part of the ovary, containing ovarian follicles at various stages (Primordial follicles, Primary follicles, Secondary follicles, Tertiary (Graafian) follicles**
- **Granulosa cells are found within the ovarian follicles surrounding the developing oocyte. The theca cells refers to a layer of cells that surround the ovarian follicle**
- **Medulla: The inner part of the ovary, composed of loose connective tissue, blood vessels, and nerves.**
- **Corpus Luteum and Corpus Albicans: After ovulation, the ruptured follicle becomes the corpus luteum, which secretes hormones. If pregnancy does not occur, it becomes the corpus albicans.**



# Classification of ovarian tumors

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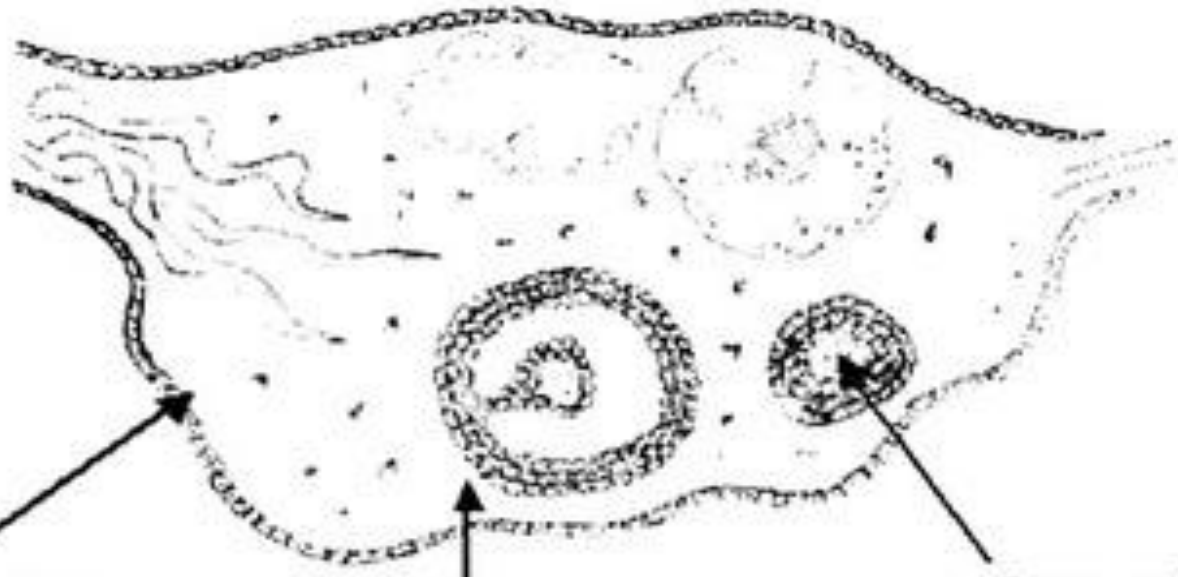
## *Neoplastic lesions of the* Ovaries

**I-Surface epithelial tumors:**
-Serous
-Mucinous
-Endometroid&clear cell tumors
-Transitional (Brenner)

**2-Germ cell tumors:**
- Teratoma
- Dysgerminoma
- Yolk sac tumor
- Choriocarcinoma
-Mixed germ cell tumor

***3-Sex-cord stromal tumors:***
-Granulosa-thecal cell.
-Thecoma-fibroma.
-Sertoli-Leydig cell tumor.

# Classification of ovarian tumors



**Surface epithelium-stroma**

- Serous
- Mucinous
- Endometrioid
- Clear cell
- Transitional cell

**Sex cord-stroma**

- Granulosa cell
- Thecoma
- Fibroma
- Sertoli cell
- Sertoli-Leydig
- Steroid

**Germ cells**

- Dysgerminoma
- Yolk sac
- Embryonal carcinoma
- Choriocarcinoma
- Teratoma

# Surface epithelial tumors

## Type

- Serous
- Mucinous
- Endometroid
- Transitional (Brenner's Tumor)
- Clear

## Behavior

- Benign
- Borderline
- malignant

# Surface epithelial tumors:

## SEROUS

**1-serous cystadenoma**

**2-Borderline serous tumor**

**3-serous cystadenocarcinoma**

- Malignant show increased CA-125

- Age:
- benign: 30-40 years
- malignant: 45-65years

# Serous Cystadenoma

- **Gross:**

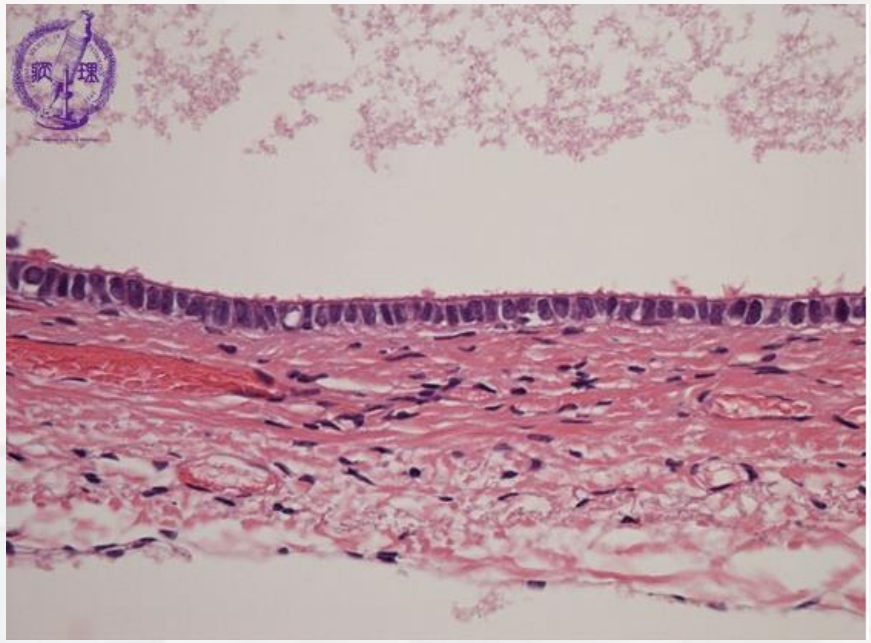
- **Cyst**
- **Small (5-10cm) or large 30-40cm in diameter,**
- **Spherical to ovoid**
- **Unilateral or bilateral**
- **Cut section:**
- **Unilocular or multilocular**
- **Filled with clear serous fluid**
- **The serosal covering is smooth and glistening.**
- **less Papillary projections.**

# Serous Cystadenocarcinoma

- **Gross**
  - Partly cystic partly solid mass
  - Usually large
  - cut section show nodular irregularities.
  - more prominent Papillary projections
  - Areas of hemorrhage & necrosis

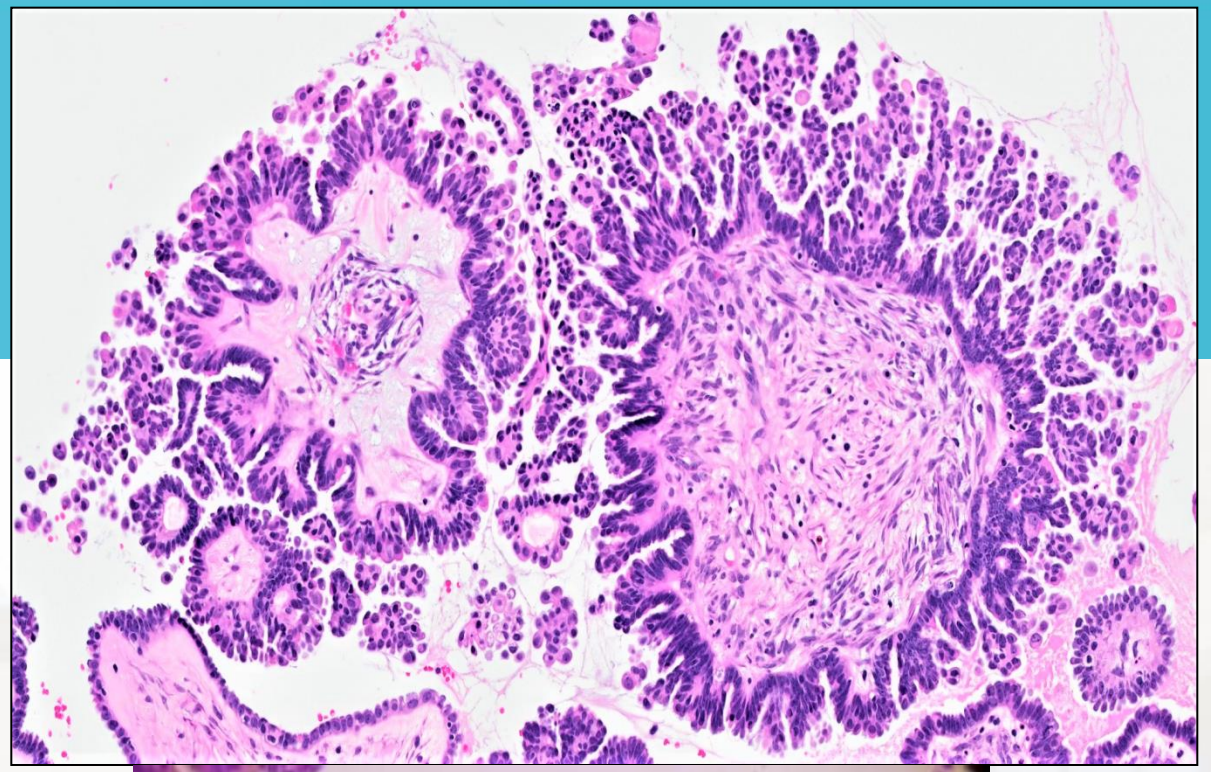
# SEROUS TUMORS
## microscopic features

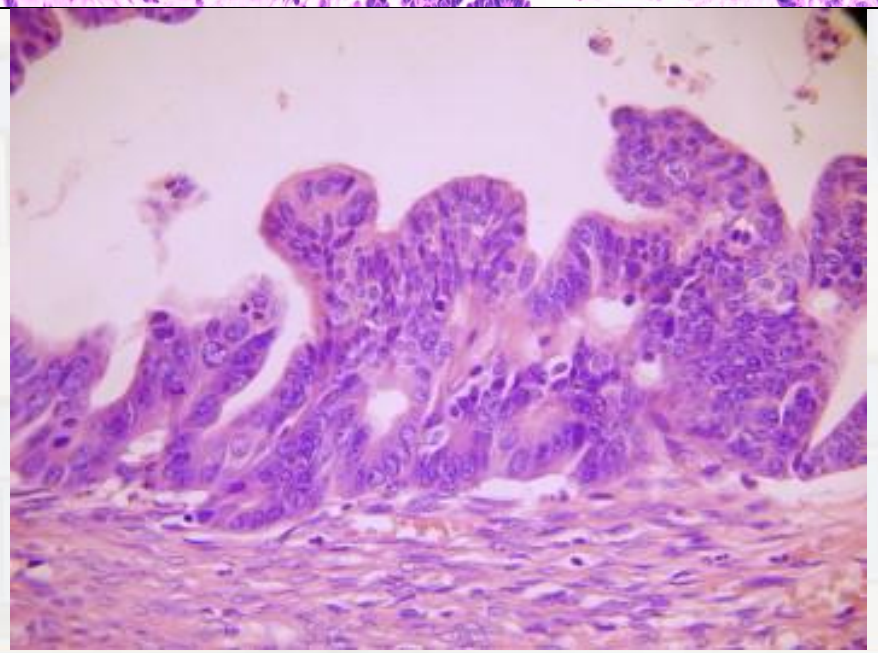
- **Serous Cystadenoma:**
- Cyst lined by a single layer of tall columnar epithelium
- The cells are in part ciliated
- The cells are uniform with **no** atypical changes
- Psammoma bodies may be seen



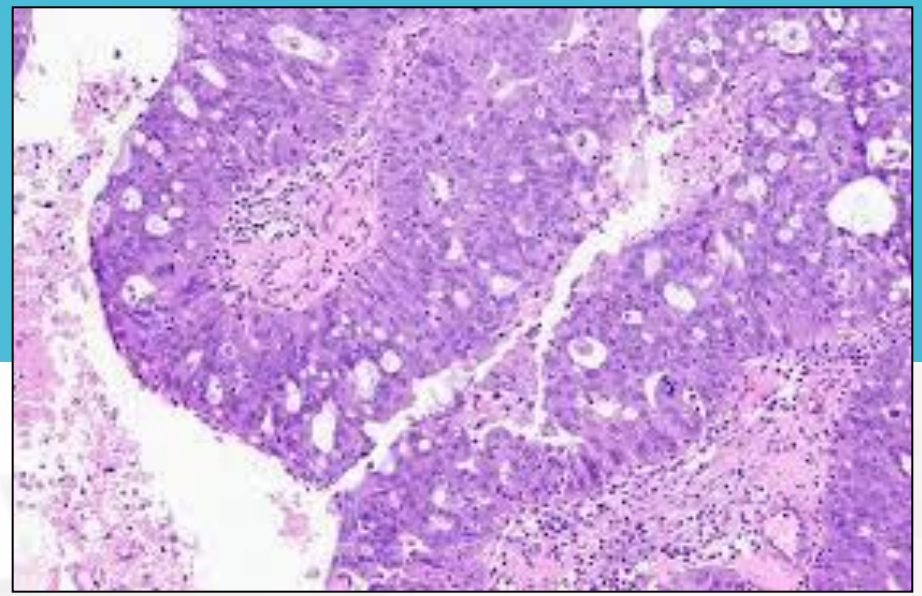
# SEROUS TUMORS
## microscopic

- **Borderline serous tumor**
- Copmlex papillae
- cytologic and nuclear atypia
- NO stromal invasion.

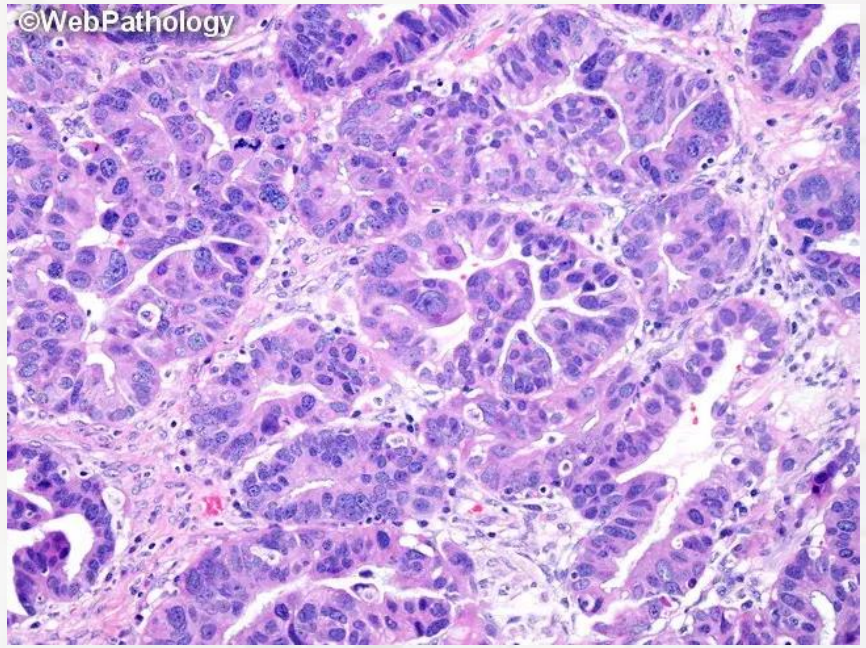




# SEROUS TUMORS
## microscopic



- **Serous Cystadenocarcinoma:**
- **Highly cellular  arranged in papillae and sheets**
- **Complex papillae lined by multilayers of highly malignant cells**
- **Significant cellular and nuclear atypia (Hyperchromasia / Prominent nucleoli / atypical mitosis )**
- **invasion of the stroma (key feature)**



# Surface epithelial tumors:

## Mucinous

1- Mucinous Cystadenoma

2- Borderline Mucinous Tumor

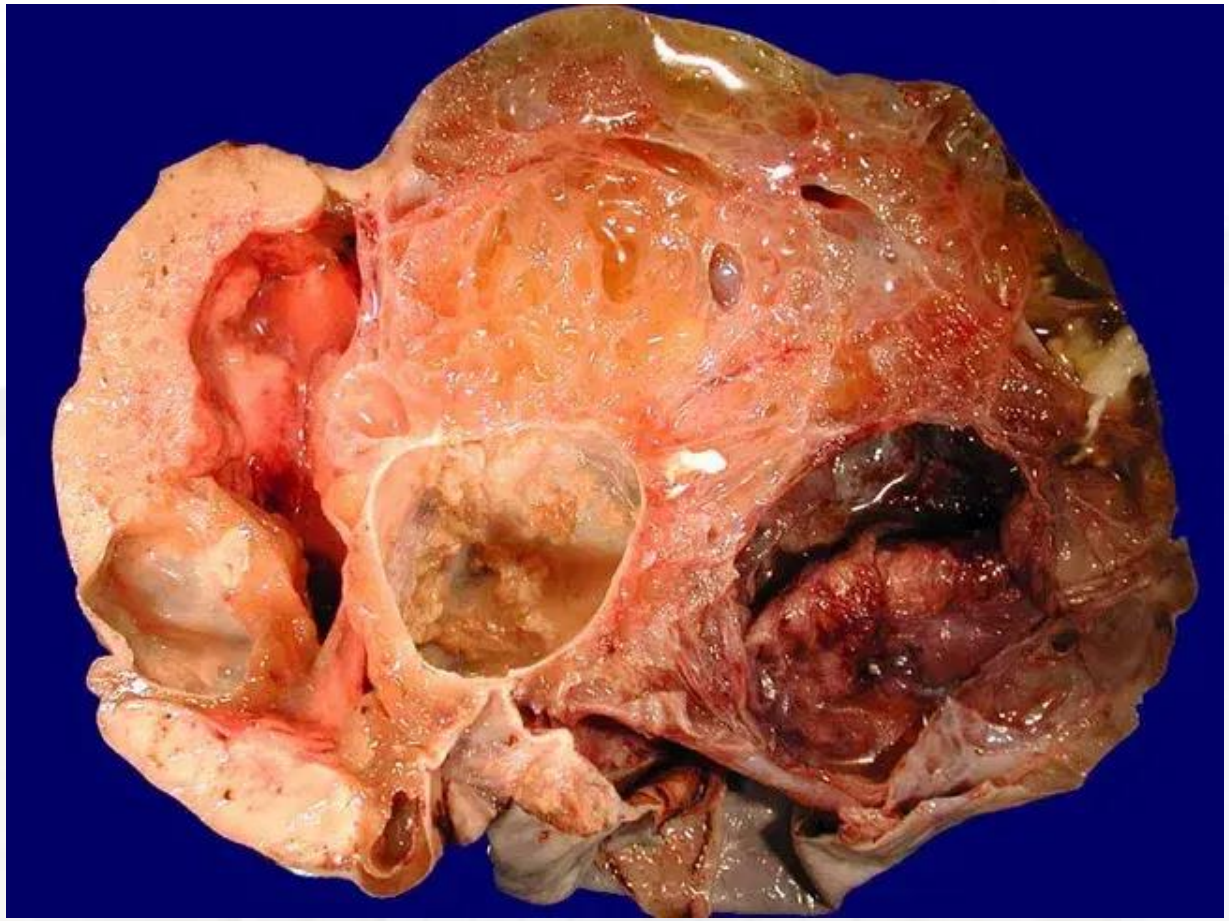
3- Mucinous Cystadenocarcinoma

# MUCINOUS TUMORS
## Gross

- **mucinous cystadenoma**
- Cyst
- larger
- unilateral or bilateral
- **cut section:**
- Unilocular or Multilocular
- with viscous mucin content (glistening surface)
- papillary formations are less common.

mucinous cystadenoma

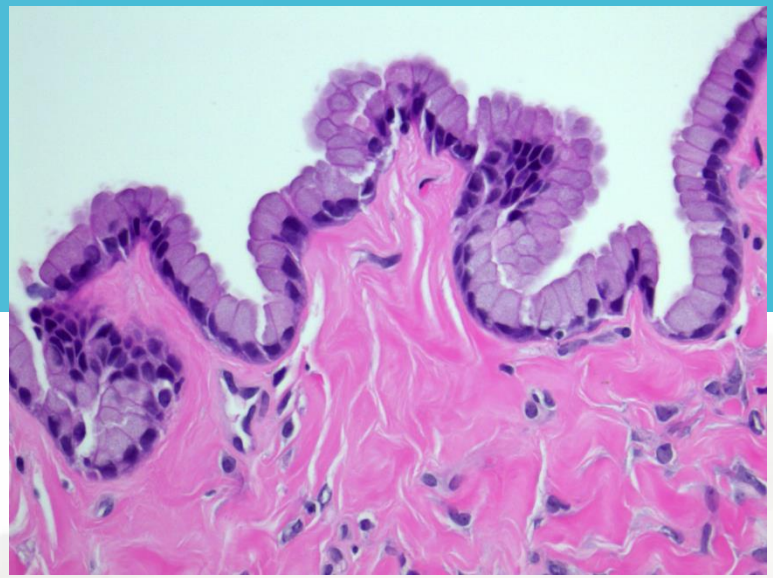
# Mucinous cystadenocarcinoma



**Gross:**

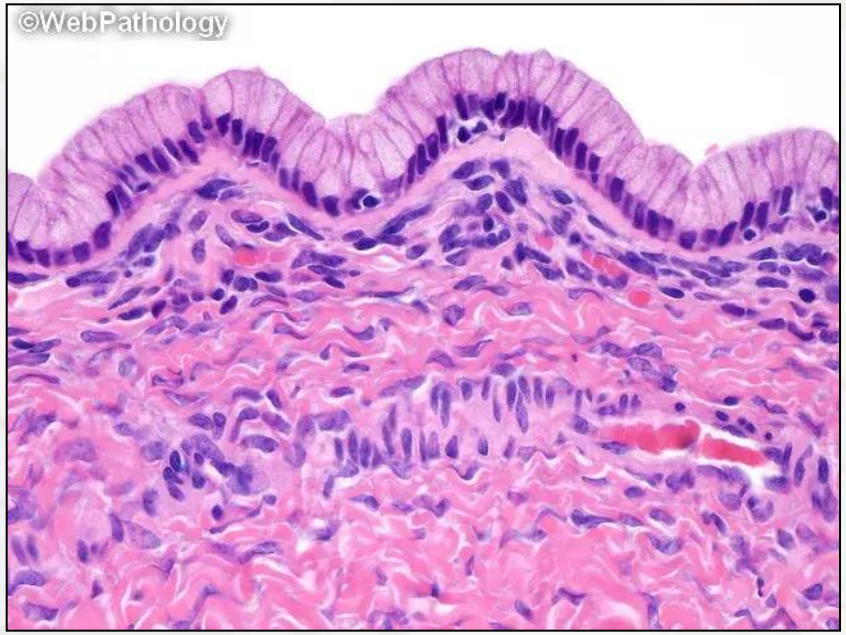
- Partly cystic partly solid
- Large
- prominent Papillary projections
- Areas of hemorrhage & necrosis

# MUCINOUS TUMORS
## microscopic



- **Mucinous Cystadenoma:**

- **The cysts are lined by a single layer of columnar mucin-secreting epithelial cells**
- **The cells are uniform with no atypical changes**

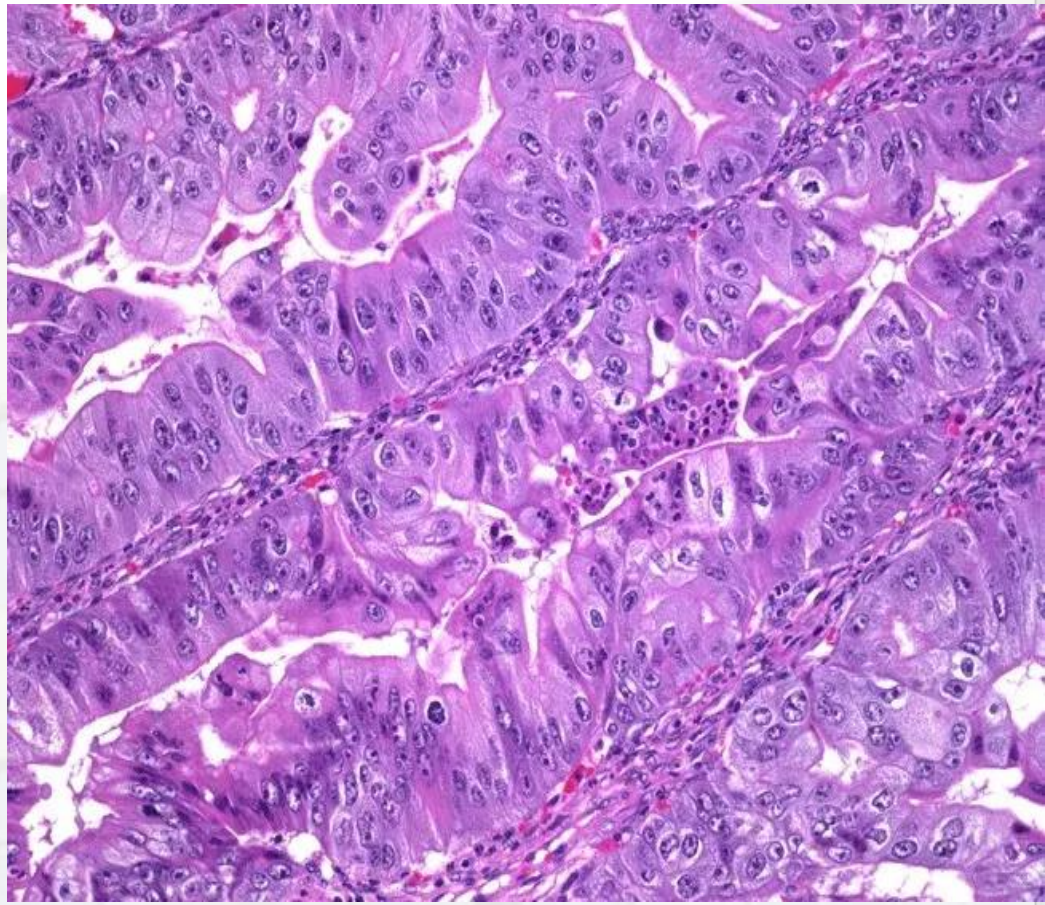


# MUCINOUS TUMORS
## microscopic

- **Borderline mucinous tumor:**
  - Complex papillae
  - cytologic and nuclear atypia
  - Mucin secreting cells
  - NO STROMAL INVASION.

# MUCINOUS TUMORS
## microscopic

- **Mucinous Cystadenocarcinoma:**
- papillary growths or solid masses
- Significant cellular and nuclear atypia (Hyperchromasia / Prominent nucleoli / atypical mitosis )
- invasion of the stroma (key feature)
- Mucin secreting cells may be present



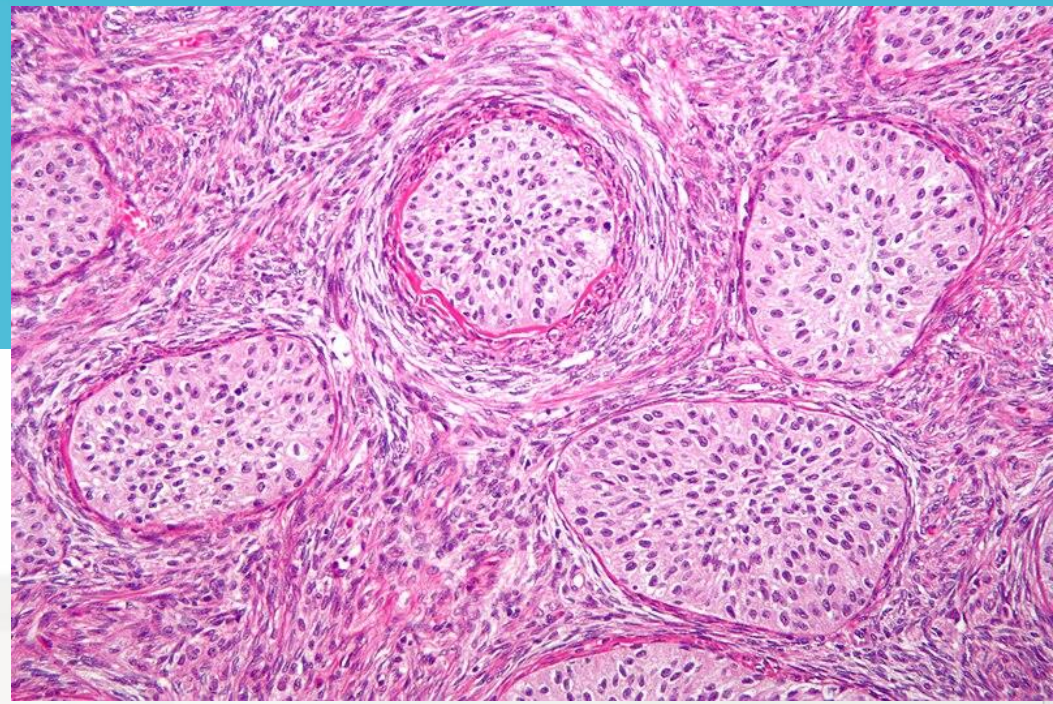
# Surface epithelial tumors:

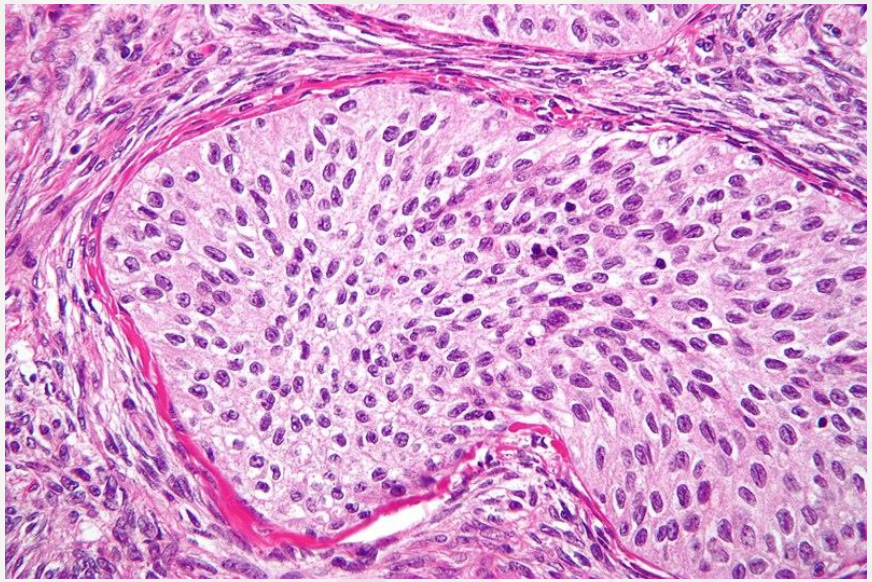
## Brenner tumor

**Characterized by transitional like epithelium**

# Brenner tumor

- Rare tumor
- Characterized by transitional like epithelium
- Benign or borderline or malignant
- Most of cases are benign
- **Key feature:**
- Nest of transitional-like cells embedded in a dense, fibrous stroma.





# Surface epithelial tumors:

## Endometroid Tumors

**Usually malignant**

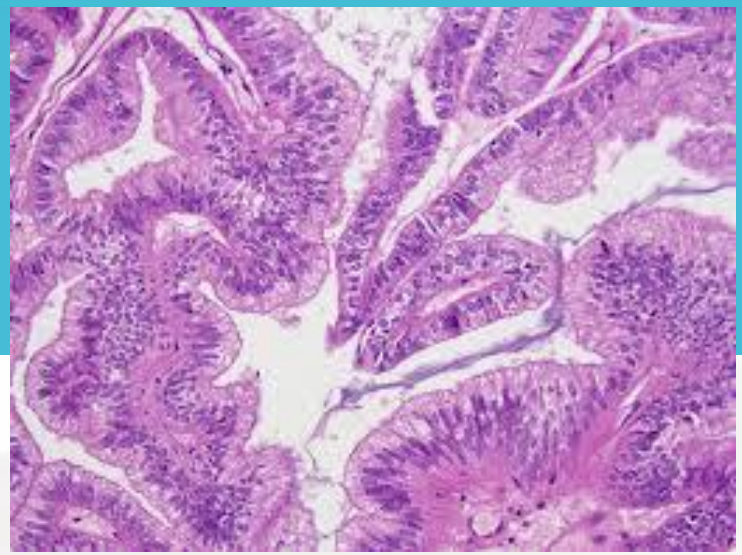
**Endometroid Carcinoma**

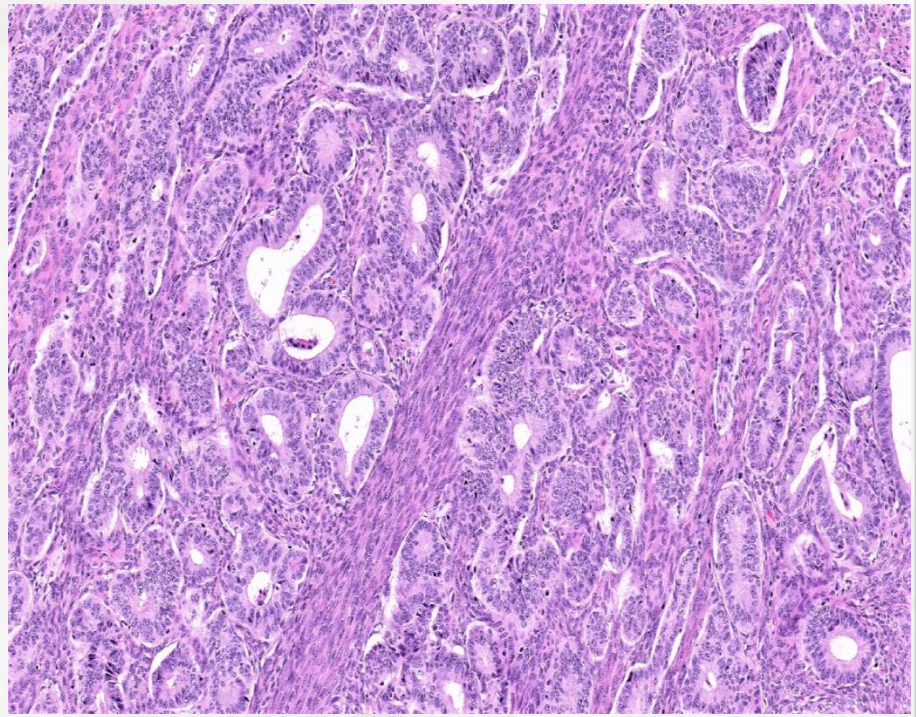
# Endometroid carcinoma

- Associated with endometriosis ( endometriotic cyst)
- **Gross :**
- Usually unilateral,
- Cystic with solid component and areas of hemorrhage

**Microscopic:**

- Glandular epithelial proliferation similar to the endometrial carcinoma.
- **variable cytological atypical**
- Desmoplastic stroma





# GERM CELL TUMORS

15%-20% of ovarian tumors.

Teratoma

Dysgerminoma

Choriocarcinoma

Yolk sac tumor

Mixed germ cell tumor

# OVARIAN TERATOMAS

- The most common ovarian germ cell tumor type

- Developed from three germ cell lines (ectoderm, endoderm, mesoderm)
- **Ectoderm**: skin, brain….
- **Mesoderm**: cartilage, bone, muscle …..
- **Endoderm**: as intestine , bronchi and thyroid

- **Three types:**

1. Mature cystic teratoma
2. Immature teratoma
3. monodermal teratomas (struma ovarii)

# *Mature Cystic Teratoma*
# *Dermoid Cyst*

- **One of the most common ovarian neoplasms**
- **These tumors are generally benign**
- **may undergo a malignant transformation in 1% of the cases.**
- **Age : 20 and 40**
- **Gross: Cyst**
- **Unilocular or multilocular**
- **contain various tissue: hair, teeth, cartilage, bone or sebaceous material**
- **Raised protuberance in cyst wall (Rokitansky nodule)**

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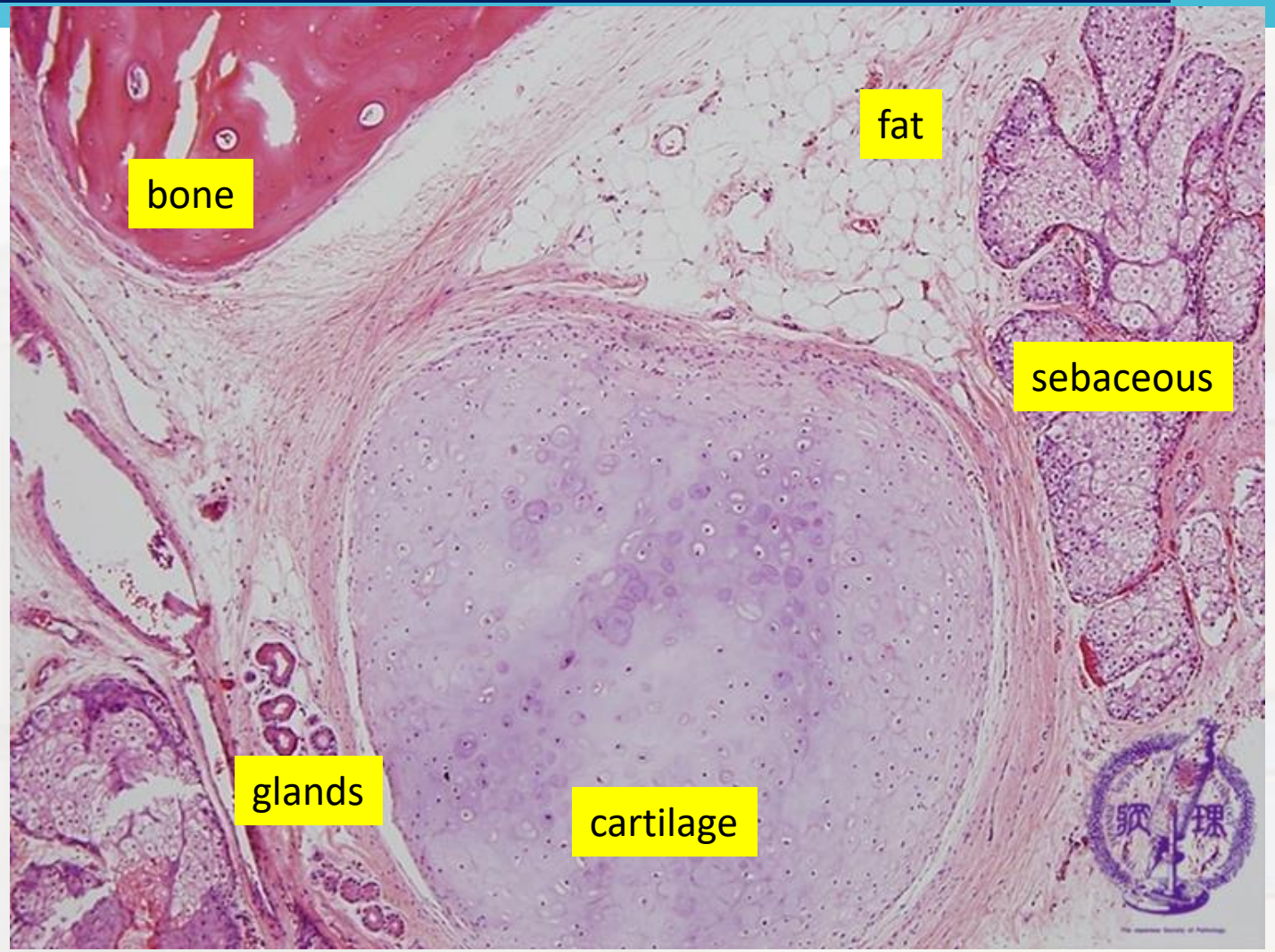
# Mature Cystic Teratoma
# Dermoid Cyst

- **Microscopic:**
- **Mixture of mature, benign tissues**
  - **Ectodermal: squamous epithelium, sebaceous glands, hair follicles, brain tissue**
  - **Mesodermal : bone, cartilage, smooth muscle, fibroadipose tissue**
  - **Endodermal: intestinal or respiratory epithelium, thyroid, salivary gland**
  - **All are well differentiated tissues.**



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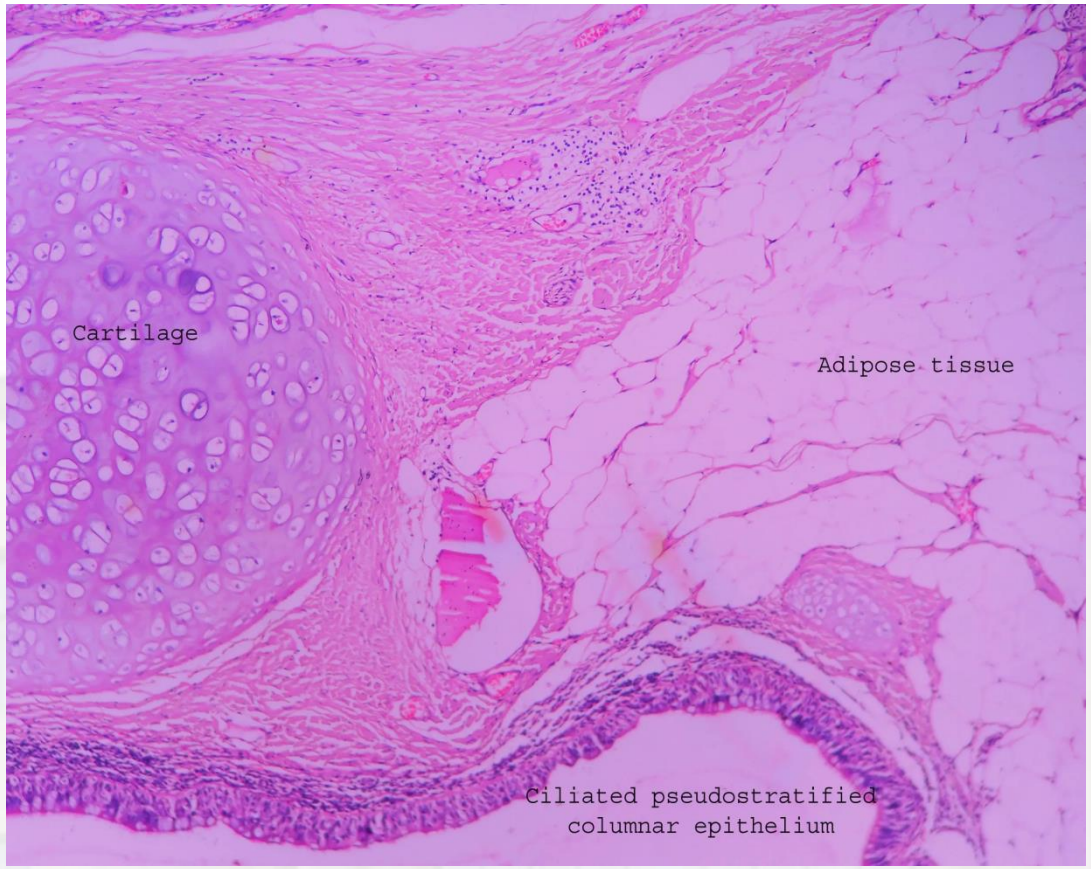
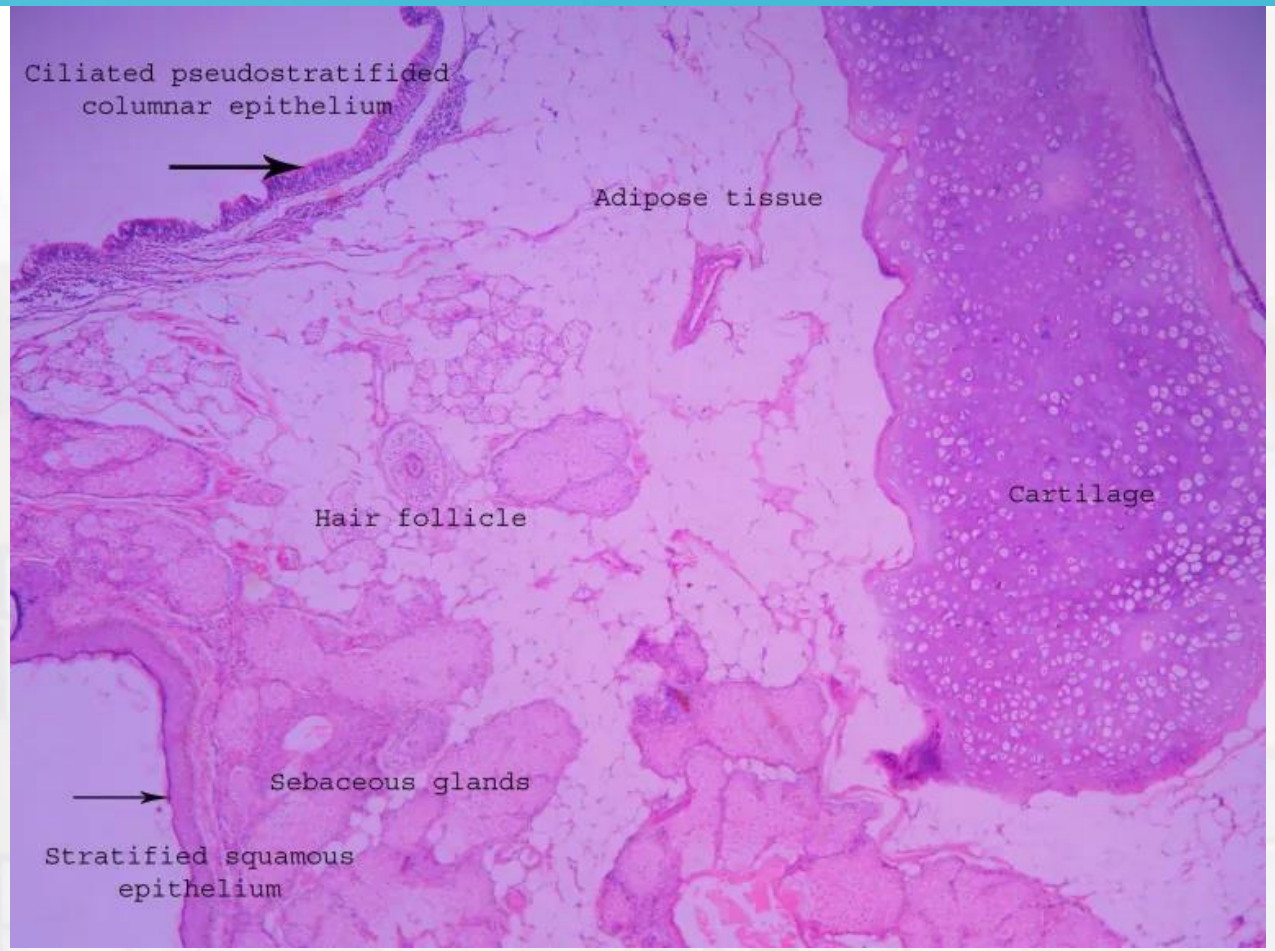
# Mature Cystic Teratoma
# Dermoid Cyst



# IMMATURE TERATOMA

- Variable amounts of

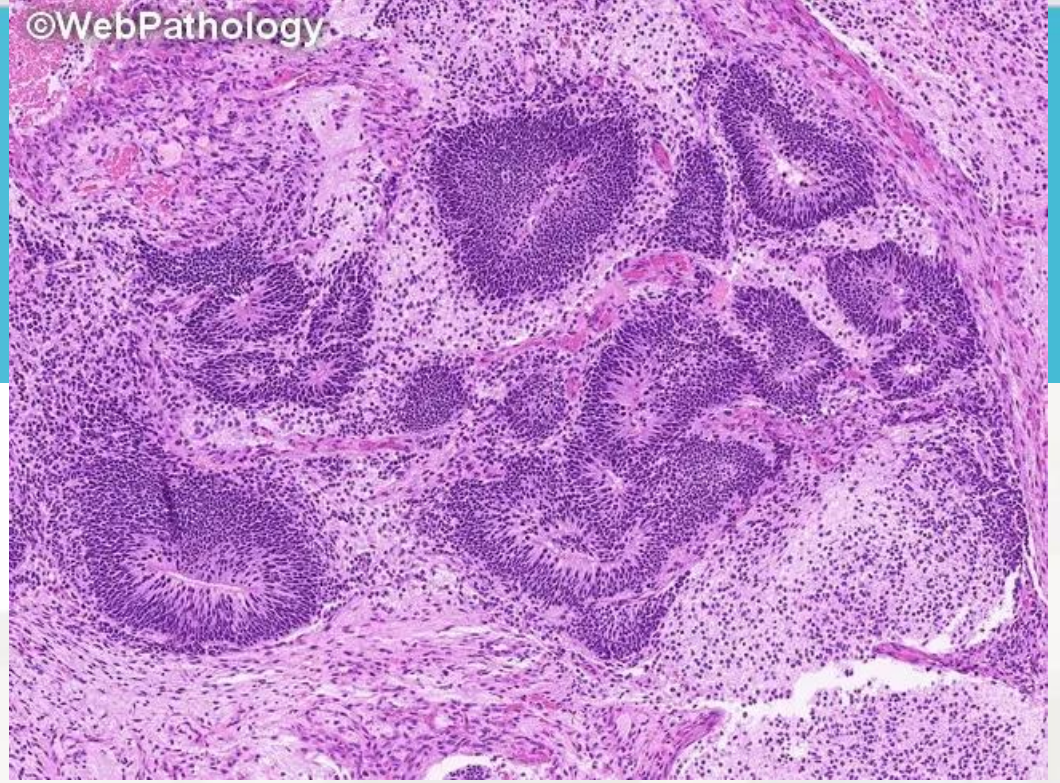
1-mature elements from all 3 germ layers

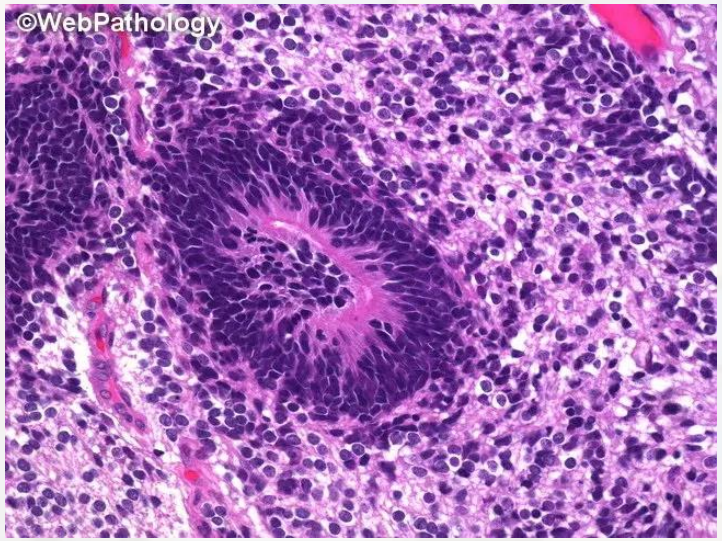
admixed with

2- immature elements especially neural tissue

- collection of primitive small blue cells arranged in rosettes).

- Bad prognosis, malignant behavior



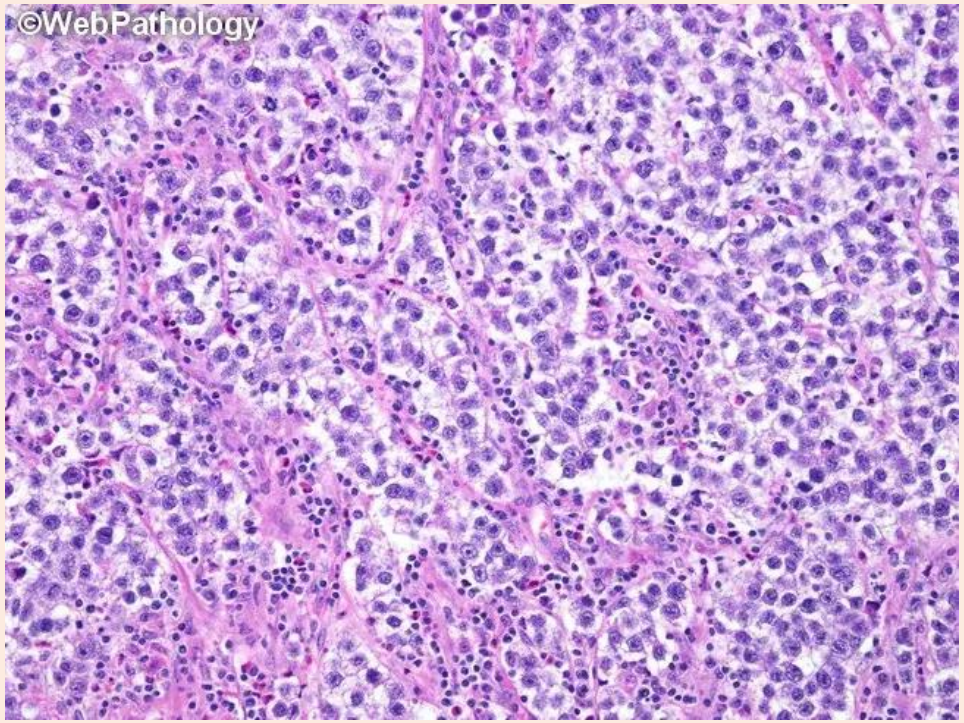
# DYSGERMINOMA

- is equivalent to Seminoma .

**Age: 2nd-3rd decades**

**Pathological Features:**

- Sheets or nests of neoplastic cells separated by delicate fibrous stroma .
- Cells :
  - large,
  - Uniform, monotonous
  - round to polygonal
  - clear, glycogen-rich cytoplasm
  - round nuclei, and conspicuous nucleoli.
- Stroma with characteristic lymphoid infiltrates.



# OVARIAN CHORIOCARCINOMA

- **Highly malignant**
- **Microscopic :**

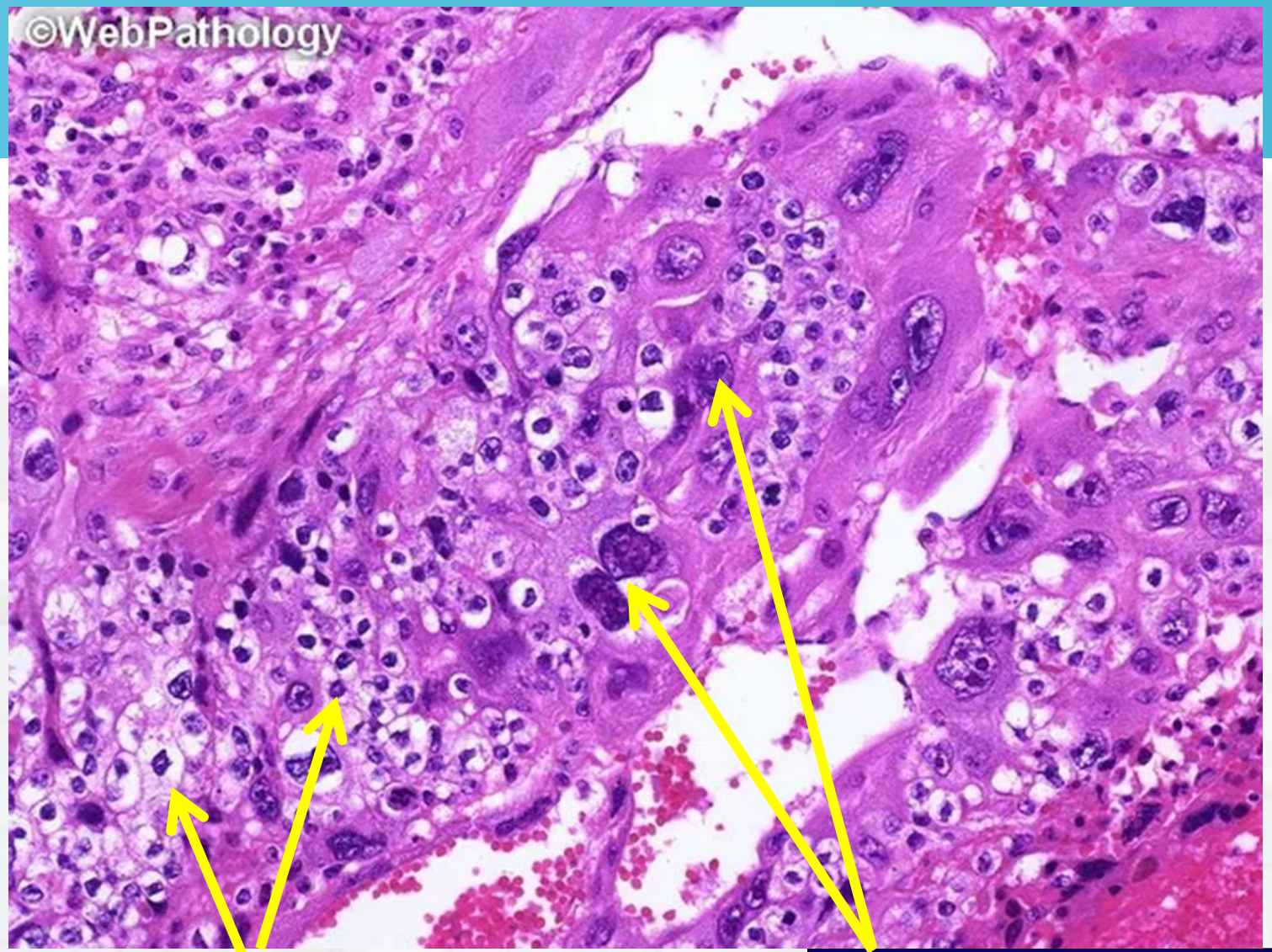
**it contain two types of trophoblastic cells:**

1. **Syncytiotrophoblasts:**

- ❑ **large**
- ❑ **Hyperchromatic cytoplasm.**
- ❑ **Typically multinucleated**

1. **Cytotrophoblast:**

- ❑ **regular**
- ❑ **clear cytoplasm**
- ❑ **single uniform nucleus.**



# Sex Cord-stromal Tumors

**Granulosa cell tumor**

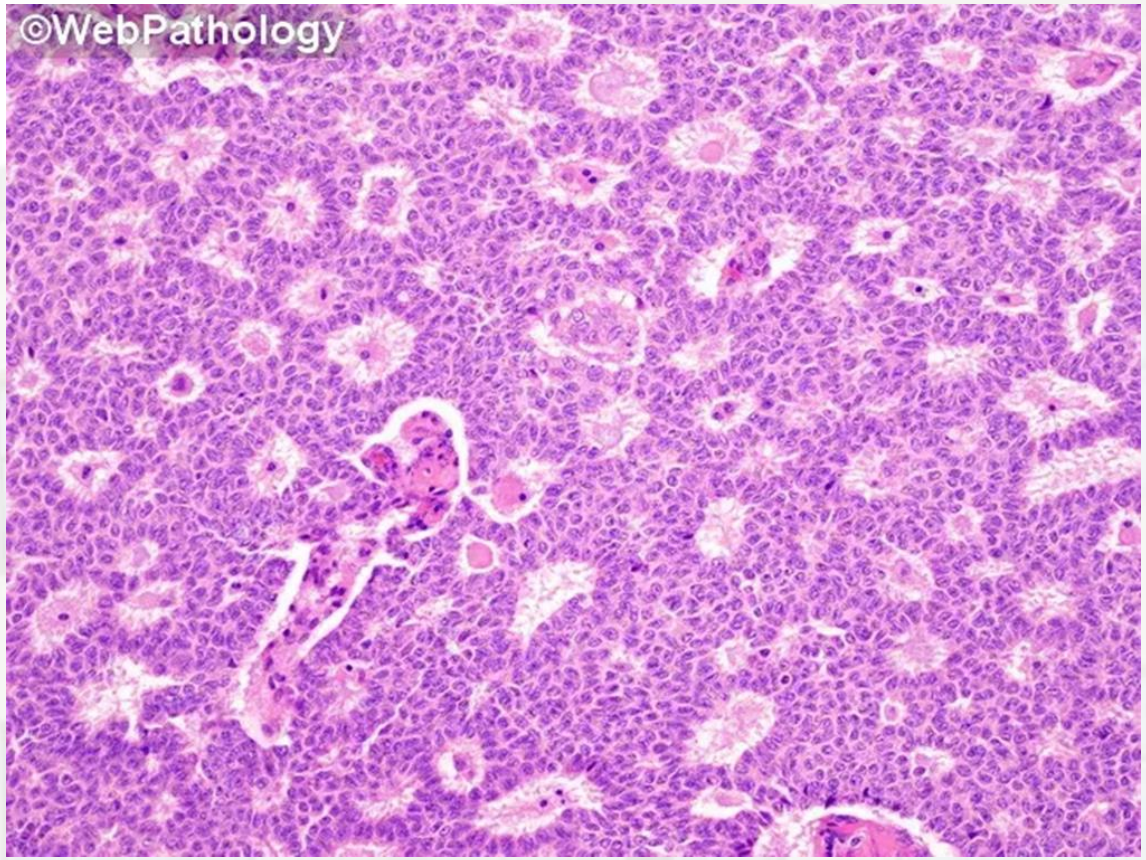
**Thecoma**

**Fibroma**

**Sertoli-Leydig cell tumor**

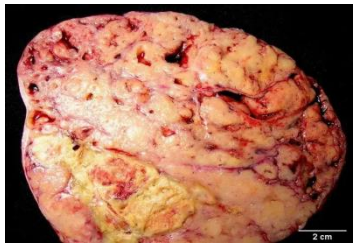
# GRANULOSA CELL TUMORS

- 2-5% of all ovarian tumors
- usually benign
- Functioning: estrogen secreting tumor
- *Characteristic features:*
- microfollicular pattern
- numerous Call-Exner bodies lined by multilayers of granulosa cells

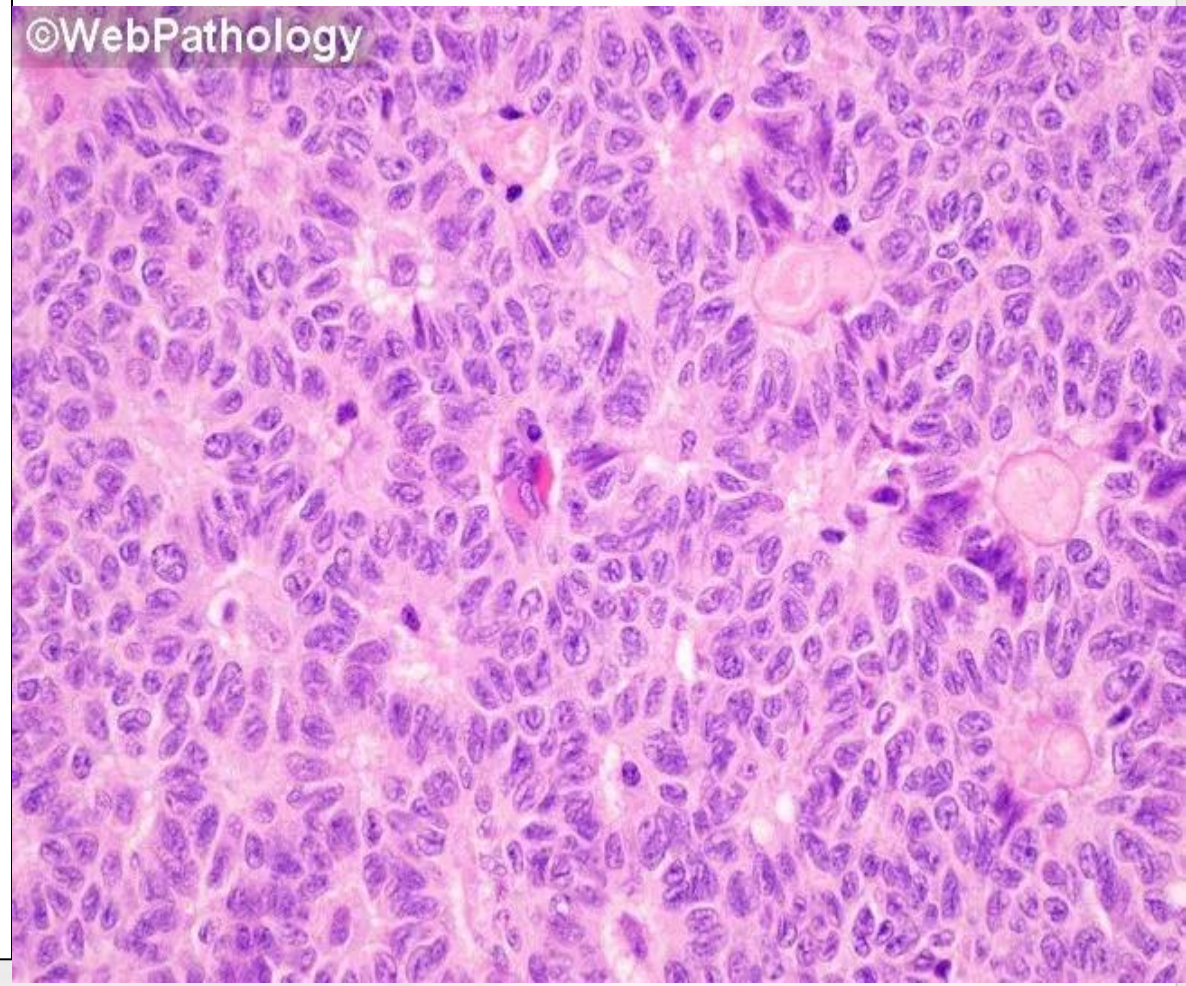


# GRANULOSA CELL TUMORS

- **Gross:**
- predominantly solid with small cystic spaces and has a pink-tan, lobulated cut surface with areas of hemorrhage and necrosis

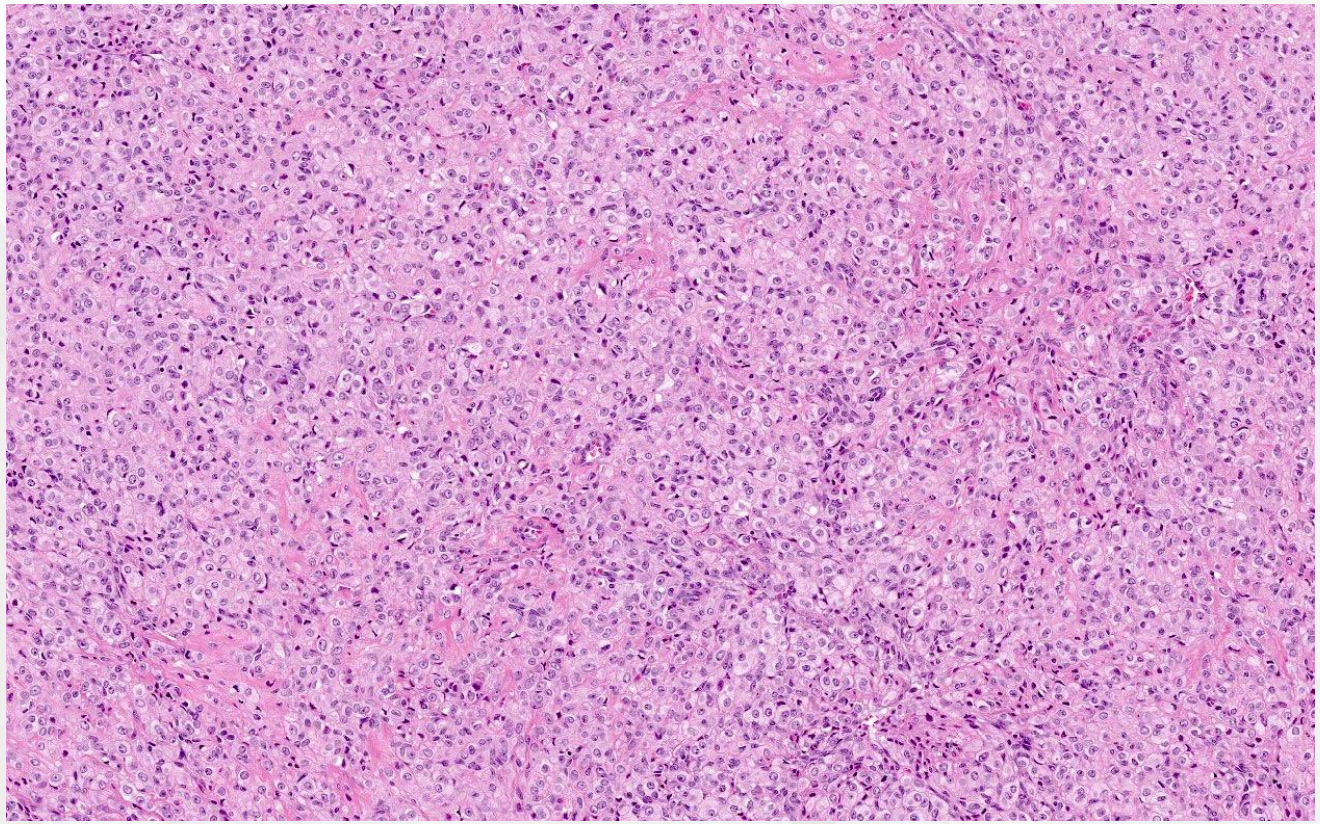


- **Microscopic features:**
- **Microfollicular pattern:**
- Tumor cells form small, round follicles
- **Call-Exner bodies:**
- These are small, eosinophilic, spaces within the tumor, surrounded by granulosa cells.
- **Granulosa cells:**
- small, cuboidal, or polygonal cells with round, coffee-bean-shaped nuclei.



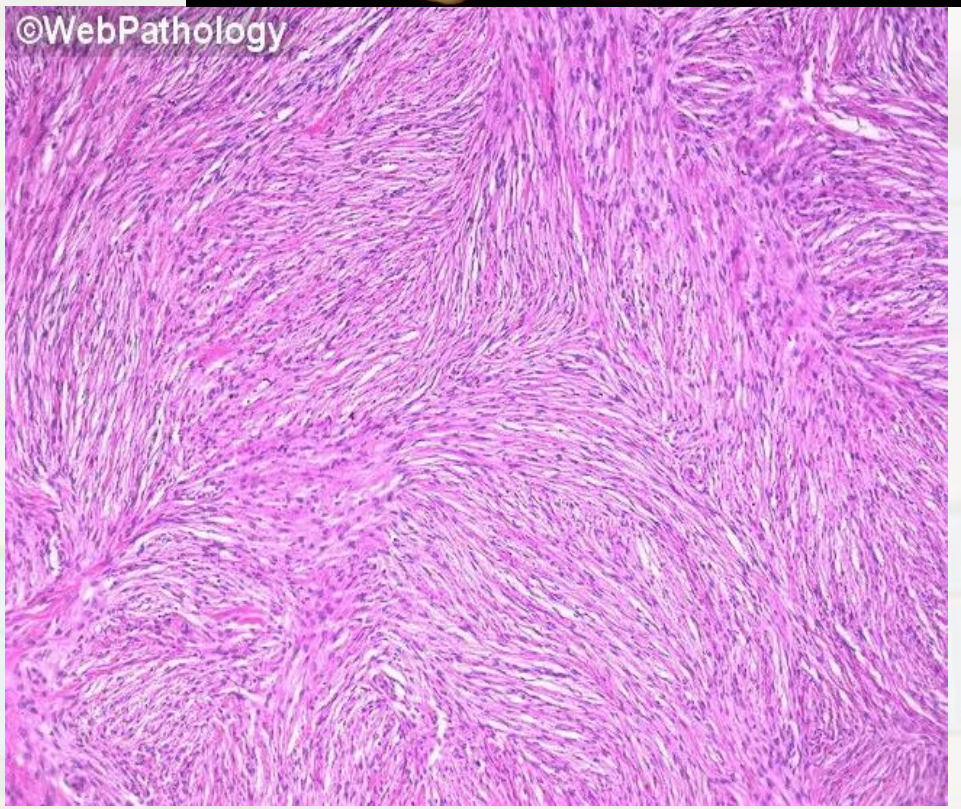
# OVARIAN THECOMA

- **Benign ( mainly)**
- **May be functioning: estrogen secreting**
- **Microscopic features:**
- **aggregates of uniform theca cells**
- **round to oval nuclei**
- **moderate amount of pale vacuolated cytoplasm (lipid-rich)**
- **indistinct cell membranes**



# OVARIAN FIBROMA

- **Benign**
- **Gross:**
- solid mass , large, firm fleshy, whitish homogenous
- **Microscopic features:**
- uniform, bland spindle cells (resembling fibroblasts)
- arranged in short intersecting fascicles or in a storiform pattern



# Hormonal effects of granulosa cell tumor/ sex cord tumor

- **Hyperestrogenism( mainly)**

1. **menstrual irregularities (metrorrhagia)**
2. **postmenopausal bleeding**
3. **endometrial hyperplasia / carcinoma**
4. **precocious puberty(if in children)**
5. **Increased risk of breast cancer**

- **Hyperandrogenism ( very rare)**

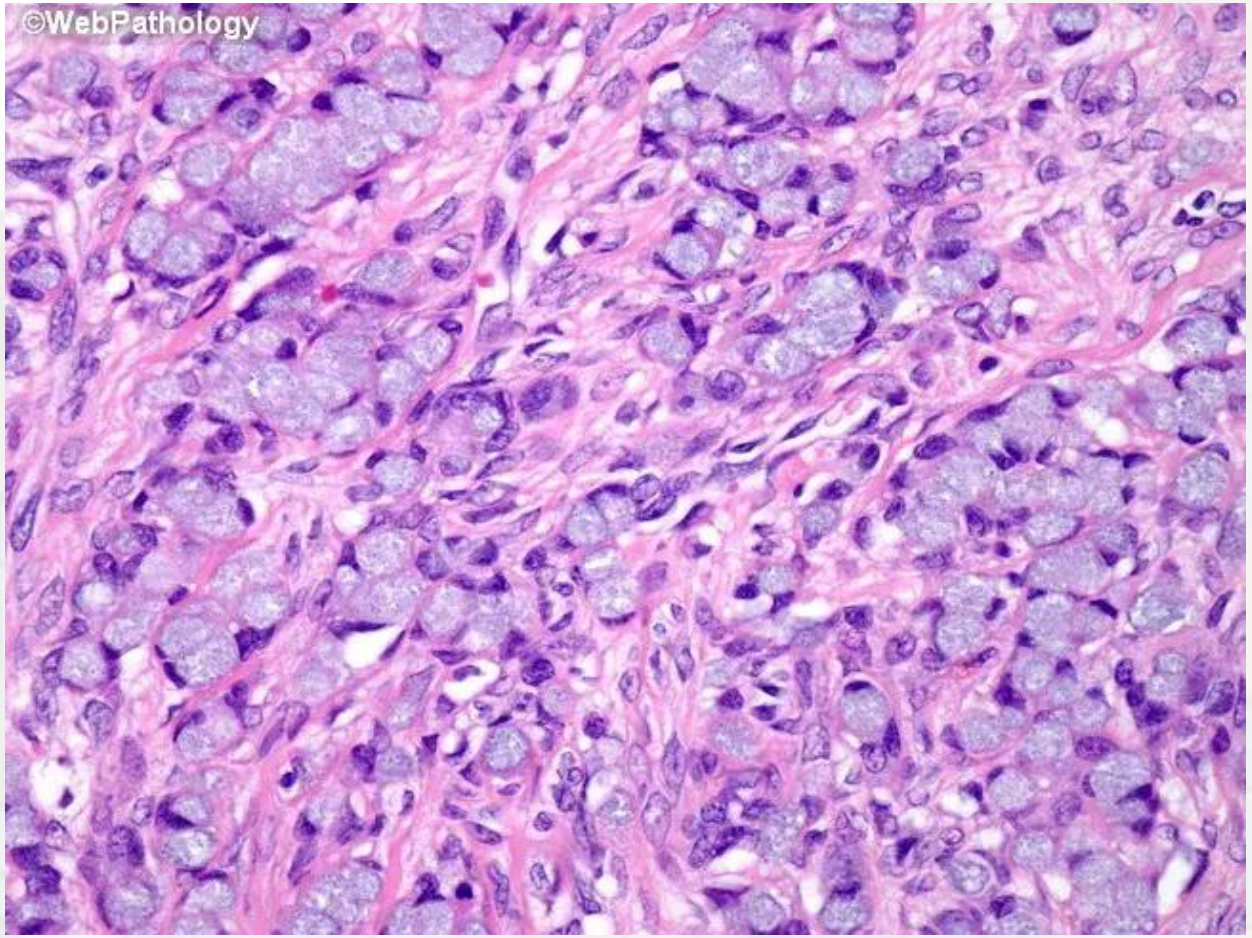
**virilization or hirsutism**

# Complications of ovarian neoplasms

1. Torsion of cyst (infarction)
2. Rupture (Hemorrhage / peritonitis)
3. Adhesions
4. Infection
5. Intestinal obstruction.
6. Hormonal imbalance ( in sex cord tumors)
7. Infertility
8. Chronic pelvic pain
9. Complications during pregnancy ( abortion)
10. Malignancy : invasion and metastasis

# Metastatic tumors of ovary

- Usually bilateral.
- **Krukenberg tumors:**
- ovarian metastases in which the tumor appears as nests of mucin-filled signet-ring cells within a cellular
- The **stomach** is the primary site in 75% of cases
- other Krukenberg tumors are from the **colon**.



# Ovarian cysts

## Non neoplastic

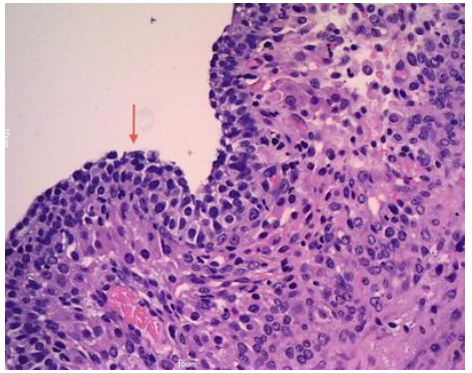
- Follicular cyst
- Corpus luteum cyst
- Endometrioma
- Polycystic ovary.

## Neoplastic

- Serous cystadenoma / cystadenocarcinoma
- Mucinous cystadenoma / cystadenocarcinoma
- Dermoid cyst

# Follicular cyst

- ***Etiology*: Failure of rupture of graffian follicles,**
- ***Gross*:**
- **Unilocular**
- **Immediately under the serosal covering of the ovary.**
- **Variable size ( at least 3 cm in diameter)**
- **thin wall with Smooth lining.**
- **Filled with clear serous fluid.**



- ***Microscopic:***
- **Small cysts are lined by granulosa cells, but as the fluid accumulates, pressure may cause atrophy of these cells.**

# Stein-Leventhal syndrome polycystic ovary syndrome (PCOs)

**Definition:**

- **Complex disorder characterized by:**

**1- hormonal dysfunction:**

**hyper androgenism / insulin resistance/ hyperestrogenism**

**2- ovulatory dysfunction: hypo ovulation / anovulation**

**3- polycystic ovary : multiple small cysts in both ovaries**

# Stein-Leventhal syndrome polycystic ovary syndrome (PCOs)

**Pathophysiology:**

1. elevated ratio of luteinizing hormone (LH) to follicle-stimulating hormone (FSH), which disrupts normal ovarian function. This results in anovulation .
2. Anovulation → the follicles in the ovaries do not mature properly and fail to release ova. Instead, these immature follicles become cystic (follicular cysts) and accumulate, leading to the characteristic "polycystic" appearance

**Clinical features:**

1. **Menstrual Irregularities:** Oligomenorrhea / Amenorrhea
2. **Hyperandrogenism** : Hirsutism / Acne /Alopecia
3. **Infertility**
4. **Insulin Resistance** : increased risk of developing type 2 diabetes.
5. **Obesity**: particularly central

# Stein-Leventhal syndrome polycystic ovary syndrome (PCOs)

## Gross :

- Enlarged ovaries with thickened cortex and smooth surface
- multiple small subcortical cysts

## Microscopic:

- multiple follicular cysts covered by a dense fibrous capsule.
- Hyperplasia of the theca interna cells leading to increased androgen production.
- Hyperplastic stroma with possible mild fibrosis.
- Absence of mature corpus luteum.

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# FLASHCARDS

- A 36-year-old woman presents with pelvic discomfort and mild bloating. Pelvic ultrasound reveals a unilocular cyst with thin walls and no solid components. The CA-125 level is normal. The lesion is surgically excised, and histopathology reveals a benign epithelial tumor with no mitotic activity or atypia.
- What is the most likely diagnosis?
- A) Serous cystadenoma
  B) Serous cystadenocarcinoma
  C) Serous borderline tumor
  D) Endometrioid carcinoma
- Answer: A) Serous cystadenoma

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# FLASHCARDS

- A 35-year-old woman presents with irregular menstrual cycles and pelvic pain. Imaging shows a cystic ovarian mass with papillary projections. The CA-125 level is mildly elevated. On histopathology, the tumor shows non-invasive epithelial cells with nuclear atypia and no stromal invasion.
- Which of the following is the most likely diagnosis?
- A) Serous cystadenoma
  B) Serous cystadenocarcinoma
  C) Serous borderline tumor
  D) Endometrioma
- Answer: C) Serous borderline tumor

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# FLASHCARDS

- **A 48-year-old woman presents with increasing abdominal distension and discomfort. On ultrasound, a large cystic ovarian mass with papillary projections is identified. The patient's CA-125 levels are elevated. On histopathological examination, the tumor is characterized by papillary structures with nuclear atypia , psammoma bodies and stromal invasion. Which of the following is the most likely diagnosis?**
- **A) Serous cystadenoma**
  **B) Serous borderline tumor**
  **C) Serous cystadenocarcinoma**
  **D) Mucinous cystadenoma**
- **Answer: C) Serous cystadenocarcinoma**

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# FLASHCARDS

- **A 60-year-old woman presents with increasing abdominal discomfort and bloating. Ultrasound reveals a large ovarian mass with cystic and solid areas. The CA-125 level is markedly elevated. Histopathology shows mucin-producing epithelial cells with significant nuclear atypia and stromal invasion.**
- **Which of the following is the most likely diagnosis?**
- **A) Mucinous cystadenoma**
  **B) Mucinous cystadenocarcinoma**
  **C) Mucinous borderline tumor**
  **D) Granulosa cell tumor**
- **Answer: B) Mucinous cystadenocarcinoma**

# FLASHCARDS

- A 62-year-old woman presents with abdominal pain and fullness. Ultrasound reveals a complex ovarian mass with a combination of solid and cystic components. The mass is predominantly solid with some cystic areas. Serum CA-125 is within the normal range. Histopathological examination reveals a tumor composed of nests of transitional epithelial cells with dense fibrous stroma .
- What is the most likely diagnosis based on histopathology?
- A) Brenner tumor
  B) Mucinous cystadenoma
  C) Serous cystadenocarcinoma
  D) Ovarian fibroma
- Answer: A) Brenner tumor

# FLASHCARDS

- A 19-year-old woman presents with acute abdominal pain and a rapidly enlarging ovarian mass. Imaging reveals a cystic mass with solid areas. Histopathology shows a mixture of differentiated tissues, including sebaceous and cartilage elements, as well as primitive cells.
- What is the most likely diagnosis?
- A) Mature teratoma
  B) Immature teratoma
  C) Dysgerminoma
  D) Yolk sac tumor
- Answer: B) Immature teratoma

# FLASHCARDS

- A 45-year-old woman presents with irregular menstrual bleeding and signs of estrogen excess, including breast tenderness. Imaging reveals a large, solid ovarian mass. Surgical resection is performed, and histopathology reveals the presence of Call-Exner bodies
- What is the most likely diagnosis?
- A) Serous cystadenoma
  B) Mucinous cystadenoma
  C) Granulosa cell tumor
  D) Ovarian fibroma
- Answer: C) Granulosa cell tumor

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# FLASHCARDS

- **A 28-year-old woman presents with irregular menstrual cycles, acne, and excessive facial hair. She has a history of weight gain over the past year. Ultrasound shows enlarged ovaries with multiple small cysts. Serum tests reveal elevated levels of luteinizing hormone (LH) and testosterone. What is the most likely diagnosis?**
- **A) Ovarian carcinoma**
  **B) Endometriosis**
  **C) Polycystic Ovary Syndrome (PCOS)**
  **D) Hypothalamic amenorrhea**
- **Answer: C) Polycystic Ovary Syndrome (PCOS)**

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# ESSAY QUESTIONS

1. Describe the pathological features of serous / mucinous cystadenoma
2. Describe the pathological features of serous / mucinous cystadenocarcinoma
3. Enumerate hormonal effects of granulosa cell tumor
4. Enumerate complications of ovarian neoplasms
5. Enumerate and classify types of ovarian cysts

# Thank you